CARE OF FEET [redacted]

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CARE OF THE FEET

NOTES FOR FOOT ORDERLIES

1942

By Command of the Army Council,

F. C. Bovenschen.

THE WAR OFFICE,
7th October, 1942.

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CHAPTER 1

ELEMENTARY ANATOMY OF THE HUMAN FOOT

In order to understand the prevention and cure of the common ailments to which the foot is liable, it is necessary to learn something of the principal structures of the foot and how they are designed to do their work of supporting the weight of the body.

Construction of the human foot.—The human foot consists of the following structures :—

(*a*) The bony framework.
(*b*) Ligaments or fibrous bands binding the bones together.
(*c*) Joints between the bones.
(*d*) Muscles and tendons.
(*e*) Loose tissue and fat, blood vessels and nerves.
(*f*) Fibrous sheaths.
(*g*) Skin.

(*a*) **The bony framework** consists of three groups of bones :—

(1) Seven short, strong **tarsal** or ankle-bones.
(2) Five longer **metatarsal** or instep-bones, and
(3) **The phalanges,** three for each of the four outer toes and two for the great toe (Fig. 1).

(*b*) **Ligaments.**—Strong fibrous bands called ligaments bind the bones together, strengthening the joints and helping to prevent dislocation or displacement of the bones. The tarsal and metatarsal bones thus bound together form natural arches, types of support well recognized as the strongest in existence and used in the construction of bridges and viaducts. The arch with its span from the heel to the base of the toes is called the **longitudinal arch** of the foot (Fig. 2); the **transverse arch** spans the foot from side to side (Fig. 3).

The ligaments act as cross-beams or tie-rods giving support to these arches. A strong layer of fibrous tissue passing from the heel to the toes beneath the skin of the sole gives additional support.

The ligaments allow a certain amount of play between the bones and absorb much of the shock to which the foot may be subjected. These ligaments can sustain a certain amount of strain, but, if subjected to sudden and severe strain, will break. If, however, they are continuously stretched over a

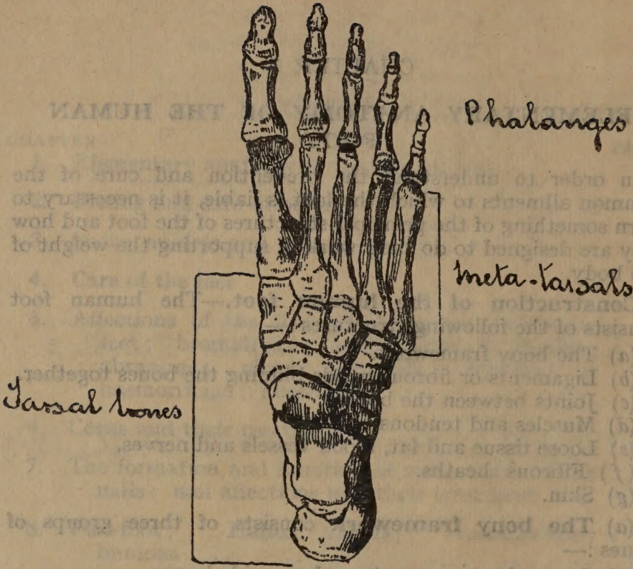


FIG. 1.

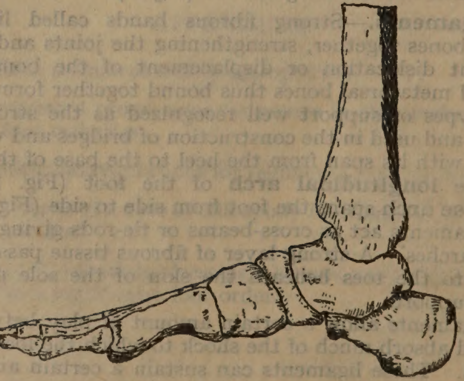


FIG. 2.

prolonged period, they will gradually give and become lax. If this occurs the arch will tend to drop and "flat-foot" develop (Chap. 8).

(*c*) **Joints.**—The ankle-joint and the joints of the toes have a good range of free movement, but the joints between the tarsal bones allow only a small degree of movement.

Those parts of the bones which are close together and form joints, are covered with a thin layer of tough, smooth, flexible and elastic substance called **cartilage.** Each joint is surrounded by a closed sac which has a smooth lining membrane. This membrane exudes an oily material which allows the ends of bones to glide smoothly over one another.

A similar sac is to be found over the inner side and slightly under the base of the great toe, where, by acting as a water-cushion, it relieves any pressure to which that part may be subjected. Undue pressure on the sac may cause it to become inflamed and enlarged, resulting in a painful condition known as a **bunion** (p. 39). This often results from wearing boots which are too short.

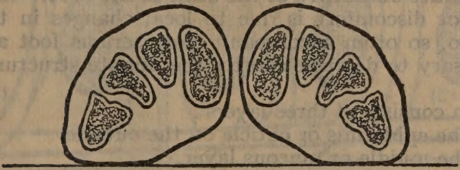


FIG. 3.

Transverse section through both feet, showing arches formed by the bones of both feet.

(*d*) **Muscles and tendons.**—Although there are a number of small muscles in the foot itself, it is the muscles in the leg that are most important in producing movements of the foot and toes. **Tendons** from these muscles pass in front of and round the sides of the ankle-joint and are attached to the bones of the foot. The leg muscles pull on the tendons to cause movement and they also take the strain of the body weight off the ligaments thus helping to brace and support the arch of the foot. If the muscles become weak, greater strain is thrown on the ligaments which may stretch in time and allow the arch to drop as already described. Thus it is seen that flabby muscles may lead to serious foot trouble.

The power of bracing up is lost, also, by muscles which are over-worked or over-tired. People who stand on their feet continuously for hours (shopmen, waiters) and those who habitually wear unyielding boots, suffer from wasting and slackness of these muscles with consequent flat-foot.

(*e*) Between all these structures there is a variable amount of fat and loose tissue which acts as padding and protects also the blood-vessels and nerves which supply the various structures of the foot.

(*f*) Enveloping the whole and passing up between the muscles and tendons is a strong sheath of fibrous tissue which helps to protect and keep these structures in place. It is especially strong over the sole of the foot.

(*g*) Outside all is a covering of skin, freely movable over the upper surface of the foot, but more firmly attached to the sole so that it will not slip about. It varies in thickness according to the work it is expected to perform, being thickest over the sole especially in those who work barefooted. It is thinner on the upper surface of the foot and around the joints where much flexibility is required.

The minute structure of the skin of the foot.—As a great deal of foot discomfort is due to local changes in the skin, which, also, so often accompany more serious foot ailments, it is necessary to describe shortly the minute structure of the skin.

The skin consists of three layers :

(*a*) The epidermis or cuticle on the outside.
(*b*) The middle or mucous layer.
(*c*) The dermis or true skin.

(*a*) The outer layer is composed of tough, horny, pliable tissue, formed of numbers of tiny, flat cells arranged in layers (Fig. 4). These cells are constantly being rubbed off the surface of the skin by wear and tear and are replaced by new cells derived from the middle (mucous) layer. As they get nearer the surface, these new cells become tough and horny so that they are fitted for their protective work. This is why our skin is never worn through by the ordinary wear and tear of daily life.

If friction or pressure on the skin is increased, the thickness of the horny layer increases in proportion. Thus, pressure or friction from badly-fitting boots cause small local thickenings known as **corns.** As no nerves or blood-vessels are found in this outer skin layer, surface cuts involving only the horny layer are painless and do not bleed. Thus corns can be pared without causing pain or bleeding (Chap. 6).

(*b*) The middle or mucous layer is composed of a less densely packed network of cells, ready to harden and take their place in the horny layer as required. This soft layer allows fluid, which may be exuded from the deeper blood vessels, to pass through it, but the horny layer is impervious to fluid. When fluid collects between these layers, the outer layer is raised up and stripped away from the middle layer, and a **blister** is formed.

(*c*) The third and deepest layer is called the dermis or "true skin." It is dense, tough, but at the same time, elastic tissue. This layer contains numerous blood-vessels and the blood contained therein gives a pink colour to the skin.

A number of conical projections called papillae give the

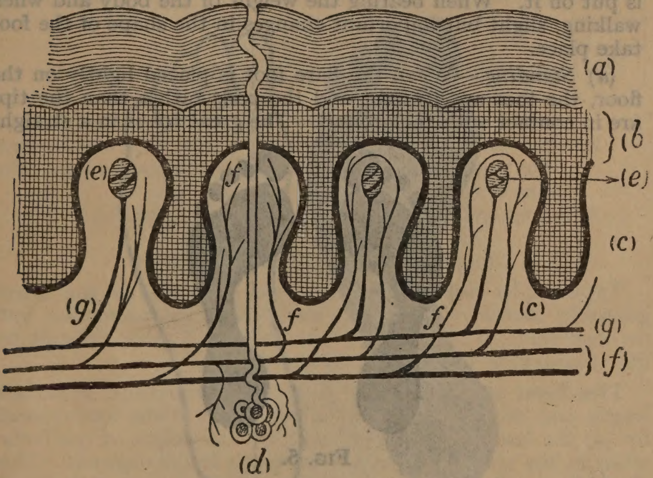


FIG. 4.

Diagram of microscopical section of skin : (*a*) Superficial horny layer ; (*b*) middle or mucous layer ; (*c*) deep layer or true skin ; (*d*) sweat gland ; (*e*) nerve ending ; (*f*) blood-vessels ; (*g*) nerves.

upper surface of this layer an irregular outline. The nerves of sensation run into the papillae and end in bulbous swellings which register pain, pressure, heat and cold and endow us with the sense of touch.

As there are a great number of papillae in the pads of the fingers, the palms of the hands and the soles of the feet, these parts of the body have a very acute sense of touch.

The **sweat glands** are little coils of tubing found in the loose tissue beneath the deepest layer of the skin. Sweat formed in the glands flows along tiny ducts which pierce all three skin layers and open on the surface. The flow of sweat to the skin surface increases greatly when marching or taking other hard exercise.

Sweat glands are very numerous on the soles of the feet and, if the production of sweat from these glands is excessive, the condition, known as hyperidrosis or "sweaty feet," will require treatment (Chap. 5).

The nails are appendages of the skin consisting of modified horny cells firmly welded together (Chap. 7).

Characteristics of the foot.—As has been described, the foot is not rigid and is able to give, within limits, when strain is put on it. When bearing the weight of the body and when walking, slight but important changes in the shape of the foot take place.

(*a*) *Standing*.—When the bare foot is placed lightly on the floor, the toes are straight and the pads rather than the tips are in contact with the ground. The great toe is in a straight line with the inner side of the foot. The heel is upright and the inner border of the foot arched—not in contact with the ground between the heel and the ball of the foot (Fig. 5).

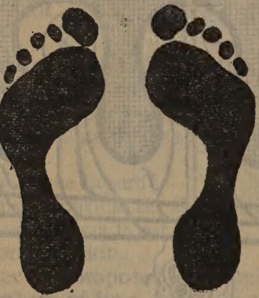


FIG. 5.

When the whole weight of the body is thrown on the foot, the added strain causes the arch of the foot to flatten slightly and the front part of the foot is forced forwards. At the same time the outer edge of the foot is forced downwards and outwards while the great toe tends to spread away from the other toes. Thus when bearing weight, both the length and the breadth of the foot increases.

When the weight of clothing and equipment is added, this spreading of the foot is still further increased, but even under load, the arch should not flatten to such an extent that the inner border of the foot between the heel and the ball of the foot comes in contact with the floor (Fig. 6).

(*b*) *Marching*.—When a man is marching, movements should be free and the action of the feet and legs smooth and precise. When moving to the front, the feet should be directed forwards; they should be brought to the ground lightly and contact should occur as a rolling movement from heel to toes. The toes should remain straight; during the forward swing this gives suppleness to the ankle and during contact with the ground it gives spring to the walk.

If the boots are too short, the toes will be concertina'd back towards the foot and the skin over the prominent joints chafed. In time the skin under the toes will become shortened and the joints stiffened thus preventing the toes from straightening out and deformity of the toes and toe-nails will result. A variety of strains throughout the foot are likely to occur and stiffness of the foot is observed when marching and the step loses its resilience.

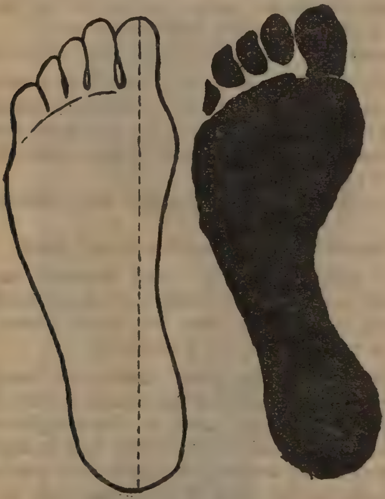


FIG. 6.

The normal foot rests on the ball of the great toe, the outside edge of the foot and the heel: Meyer's line being an imaginary axis running from the centre of the great toe to the centre of the heel.

When designing and fitting the soldier's boot it is obviously important that sufficient length and breadth should be available to allow the natural expansion of the foot to take place inside the boot, but at the same time, too large a boot will fail to support the foot and protect it from overstrain.

CHAPTER 2

FITTING AND CARE OF BOOTS

The normal object of a boot is to afford protection to the foot from injury, cold and wet. A soldier's boot is required to fulfil the further purpose of bracing the foot so that it may support without strain not only the weight of the body but the additional load of clothing and equipment.

The three essentials, therefore, of an army boot are :—

1. That the last or model on which it is made should be so designed to achieve the objects enumerated above.
2. That it should be of a size and fitting to accommodate the wearer's foot comfortably and allow for a certain degree of expansion.
3. A high standard of material and workmanship.

Characteristics of the army boot

Type.—The ankle boot has been selected as the most generally useful type. Knee boots give good protection but are expensive in comparison and are much more difficult to fit. Shoes give relatively little protection.

The Last is designed to give, inside the boot, sufficient length and breadth to allow for expansion of the foot caused by (*a*) the heat of marching ; and (*b*) the weight of the body when in the erect position and carrying full equipment. The chief allowance of extra width is made in that part of the boot which accommodates the ball of the great toe, *i.e.* the extra width is disposed more to the inner than the outer side of the foot.

The Sole.—The object of the sole is to protect the foot against injury from contact with the ground.

The shape should conform to that of the normal foot, with the inner edge nearly straight and the outer edge curving gently outwards (Fig. 7).

A point greatly emphasized in a light walking shoe is the pliability of the sole. In a boot designed to withstand such wear as the army boot has to encounter, and intended, moreover, to be worn by a man carrying a certain load, this degree of pliability is unattainable. For this reason the sole of the army boot is given a decided " toe-spring." That is, in normal standing position, the front edge of the sole is raised about ¾ inch from the ground. This " toe-spring " ensures

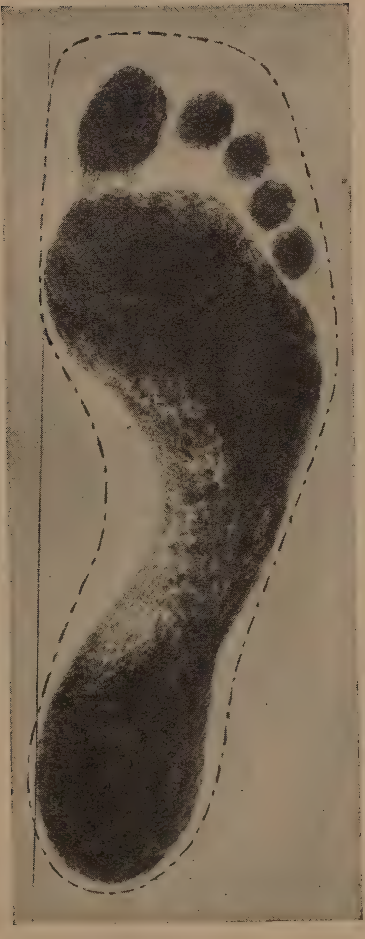


FIG. 7.

that the great toe comes to the ground in good position for the "kick-off" for each step, the heel being, at this time, well off the ground. The "toe-spring" tends to cock up the toes while standing, but it is a necessary compromise which minimizes the ill-effects of the sole itself having to be so inflexible.

The Welt.—The sole should project about ¼ inch beyond the upper all the way round, thus giving a good bearing surface and protection.

Iron Toe-tips are a useful protection when marching on rough ground, particularly on long marches when the soldier is apt to drag his feet and wear out the toes of his boots and when, marching in close order with other men in front of him, he finds difficulty in avoiding the stones and other inequalities of the road.

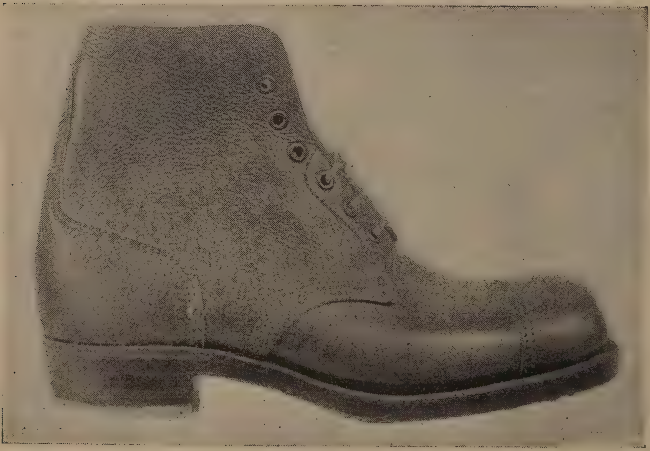


Fig. 8.—The Army Boot (Pattern 10085).

In a similar way, iron heel-tips protect the heel; in the sole, studs give grip and save the leather from excessive wear.

The Heel.—The heel of the boot serves two main purposes:—

1. In marching, it enables a man, without undue strain on the calf muscles, to reach the position of maximum purchase sooner than he would otherwise be able to do.
2. It provides a flat, wide surface for contact with the ground.

The heel should therefore be firm, broad and level. Its actual depth overall, including iron tip, is 1¼ inches—almost exactly ¾ inch more than the thickness of the sole.

The Upper.—The material of the upper should be as light as is consistent with durability and support, and the " grain " should be outside. All seams joining the various components should, of course, be external. The upper should be shaped to the heel and the toe-piece blocked up to allow of independent movements of the individual toes inside the boot.

The boot should extend high enough up the leg to be overlapped by anklets or puttees, but not so high that it interferes with movement of the ankle-joint.

The tongue should be of flexible leather. It protects the foot from abrasion by the laces and keeps out dust and grit. It should be stitched as far as the third eyelet to exclude water. To carry the tongue, at its full width, higher than this is likely to produce irksome creases.

Weight.—Though it is, above all things, necessary to keep the boots as light as possible, it is difficult for a tired man to carry a heavy weight over a rough road in a light, soft boot such as would be suitable for a country walk under ordinary conditions. A pair of army boots weighs 4½ to 5 lb., and it must be remembered that this weight has not only to be carried forward but lifted the equivalent of some 340 feet for every mile marched.

The care of boots.—Boots should always be kept in good repair, otherwise they leak, lose shape and thus tire the feet and give out at a critical moment.

Boots should be dubbined and the practice of removing the grease from boots by petrol, hot spoons, etc., and of securing a high polish with blacking should be discontinued (*see* War Clothing Regulations, 1941, para. 27). Instructions for the repair of boots will be published in the revise of War Clothing Regulations.

Boots kept in stores also need regular attention.

The fitting of boots.—The proper fitting of boots, on which the marching of the army depends, is a matter of paramount importance.

Disabilities from badly-fitting boots are a common cause of men falling out on the march.

Experience has shown that very few soldiers know how to select suitable boots. Under existing regulations company officers are required to see that boots are fitted in accordance with instructions. War Clothing Regulations, 1941, Appendix I, lays down the procedure to be followed in order that boots may be properly fitted.

Boots should be fitted indoors in a long room in which the men can walk up and down. They should be put on over regulation army socks. It must be remembered that the foot spreads out one-quarter to one-third of an inch in length, and one-fifth to half-an-inch in breadth under the weight of the full marching load.

Size (or length).—The size of the boots required should be ascertained by the use of the stick, size. When being measured, the man should wear army socks and should stand with the bulk of his weight on the foot which is being measured. Should the sliding arm of the measurement stick not rest exactly on a division, the next larger size should be taken.

Fitting (or width).—Army boots are made in three fittings—small, medium and large. The soldier should be allowed to choose, from the three fittings for his particular size, the one which is the most comfortable to wear.

Special measures.—Boots for men with abnormal foot measurements can be obtained on indent as laid down in War Clothing Regulations, 1941, para. 12.

CHAPTER 3

SOCKS, ANKLETS AND PUTTEES

(*a*) **Socks.**—A soldier, on joining as a recruit, is issued with four pairs of socks which are renewable as they become unserviceable through wear. It is most desirable that a clean and adequate supply of socks should be possessed by each man at all times. A spare pair of socks should always be carried on the march since one of the most important points in the care of the feet consists of putting on a dry pair at the end of the day after the feet have been washed.

Ill-fitting or defective socks may cause great discomfort and disability.

The army regulation sock is made entirely of wool of a threefold worsted yarn, the foot and ankle being strengthened by an additional thread of yarn.

It is designed to provide (1) an ample " cushion " between the foot and the boot ; (2) sufficient actual wool to absorb, into the fibres themselves, the maximum of perspiration which can normally be produced ; and (3) sufficient air space to allow a high degree of insulation and evaporation.

One of the most important points in regard to socks intended for marching purposes is fit. If too large, they will wrinkle and crease in the boot. If too small, they will compress the foot and wear out very quickly.

Army socks are made in one boys' and four men's sizes, the latter varying by half an inch. The size 1 sock, when new, comfortably covers the foot of a man who takes a size 8 boot. Being made entirely of wool, however, army socks shrink. It is therefore necessary to issue to a man new socks one or two sizes larger than normally fit his foot.

Army socks undergo a special process to minimize shrinkage ; and, in fact, if properly washed, an army sock should not shrink more than one inch in length. When, therefore, the soldier has been fitted as described above, he should wear his socks about barracks, etc., until they have been washed two or three times.

By improper methods of washing, however, it is possible to reduce the dimensions of a sock almost to half its original size.

The chief causes of this undue shrinkage are (1) boiling, and (2) excessive rubbing. The proper method of washing socks is described in War Clothing Regulations, 1941, Appendix II, and officers can do great service in securing, as far as possible, the enforcement of this method.

Abnormal perspiration may also sometimes cause excessive shrinkage.

Darning of holes must be carefully and properly done in order to preserve the original size and shape of the sock and offer no projections or knots. Socks with undarned holes must not be worn, as the edges of the holes are apt to curl up and lead to sore feet and abrasions, especially under the toes.

Lastly, but by no means of least importance, the sock should be clean at all times, for not only is a dirty sock hard and non-absorbent, but it is a harbourer of germs.

The following points should be borne in mind if ever, owing to failure of supplies from army sources, it should become necessary to have resort to substitutes :—

Any admixture of cotton in a sock is undesirable. Although cotton is practically immune from shrinkage (or, more correctly, "felting"), it absorbs far less moisture than wool, lacks the insulating qualities and tends to become hard in wear.

Ribbed socks, though they have the advantage of allowing a freer circulation of air to the foot, are more liable to shrink than plain ones. The regulation sock is now ribbed only at the top ; this assists in keeping it up when worn with slacks.

Seams, other than the necessary join across the toe, should be avoided, and this join should be knitted (or, more correctly, "linked"), not sewn.

In the absence of socks it is worth remembering that a substitute can be made from cloth, fairly thin flannel, or even cotton or linen. A piece about the size of an ordinary triangular bandage should be taken. The foot is placed on this with the heel in the centre of one of the sides at a distance of about 4 inches from the edge. The edge is then brought up the back of the foot to a little higher than the top of the boot, and the free ends of the bandage folded round the foot. The size of the material should be such that when the edge is on a level with the top of the boot the point should still remain long enough to come over the toes to a spot in front of the ankle level with the edge behind. The use of the foot-cloth is common in continental armies. In the absence of suitable cloth, paper may be used.

(*b*) **Anklets.**—Anklets are now issued in place of puttees except in the case of mounted units.

The anklet, which is made of web drab, helps to keep the leg dry, prevents entry of grit to the socks and relieves the knee of the drag of the trousers. Its advantages over the puttee are that it requires no particular instruction in the method of putting on the leg and that it does not tend to interfere with the circulation.

The anklet is shaped to fit over the top of the boot, the trousers being folded round the leg and tucked in at the top.

The anklet fastens round the leg by means of two web or leather straps which pass through a prongless brass buckle.

The anklet can be kept clean by web equipment cleaner.

While the web anklet is mainly issued, certain branches of the Service are supplied with a leather anklet of the same shape, but with cord fastening—the cord is passed through two eyelets and kept in position by the strap and prongless brass buckle at the top.

This type of anklet has one great advantage over the web variety—the length of wear.

(*c*) **Puttees.**—Puttees serve the same purpose as the anklet, but they give some additional support to the calf of the leg.

Unless the young soldier receives instruction in the correct method of putting them on they are apt to be applied too loosely, when they will slip off on the march, or too tightly, when they interfere with the circulation, thus affecting marching power, and, in the trenches, predisposing to the condition known as " trench foot." Wet puttees tend to shrink and, in consequence, become tight. It is essential that puttees should be kept as clean as possible by regular brushing, airing, and, when necessary, washing.

CHAPTER 4

CARE OF THE FEET

Foot inspections should be held regularly by company or platoon officers. The Manual of Elementary Drill (All Arms), 1935, Chap. VIII, para. 90 (9), instructs platoon, etc., commanders to inspect men's feet immediately after every march, but it is not only after a march that attention should be paid to the feet.

Regular care and attention at all times, especially in the case of feet which are in any way abnormal, such as those liable to excessive sweating, abrasions of the skin, corns, or those with slight deformities—bunions, claw foot, hammer toe, flat foot, or ingrowing toe-nails—always repay the time and energy expended.

It must be realized, however, that this is essentially the duty of the unit officer, and *not* that of the medical officer.

The regimental foot orderly should attend all foot inspections by unit officers, as well as the periodical health inspections of the medical officer, on which occasions he will note in a book kept for the purpose the number, rank, name and condition of the feet of any man requiring treatment (*see* Regulations for the Medical Services of the Army, 1938, para. 180 (*c*)).

Toe-nails should be kept trimmed and cut straight across. Any tendency to corn, ingrowing toe-nail, or bunion, should be at once attended to before it becomes serious. Details of the treatment of these and other abnormal conditions will be found in Chaps. 5 to 9.

Cleanliness.—It may be taken as an axiom that dirty feet are unsound feet, and therefore an O.C. an infantry or other marching unit must impress upon his men the importance of cleanliness of the feet and insist upon its observance.

Many men, before joining the army, do not appreciate the importance of clean feet. Company and platoon officers must therefore give this subject constant consideration. In camps or barracks every facility for men to keep their feet clean must be given. In most modern barracks foot-baths are now provided for the purpose.

The feet should be washed with soap and water every day while in barracks, and on active service as often as possible.

Almost as important as washing is drying after washing. The feet should be rubbed vigorously with a dry towel, special care being taken that the spaces between the toes are thoroughly dried.

Hardening the feet.—The feet may be hardened and made fit for marching in many ways. Bathing in cold water and a generous use of soap are of great value.

The socks and feet should be kept as dry as possible. The feet may be soaked regularly overnight in a solution of salt, alum or salt-petre (about a handful of any one of these in two quarts of water).

Prevention of sore feet.—Above all things keep the feet clean by the free use of soap and cold water followed by careful drying. Men who are prone to tender feet may ward off the condition by applying grease or soap to the feet, or by applying soap to the outer surface of the sole of the socks.

Sore feet are much eased by rubbing them with zinc ointment or anti-septic vaseline, or by the use of a foot powder such as "**Silantox**" or that mentioned on p. 21.

It is also helpful to wear a pair of thin civilian socks under the army ones. This allows friction to take place between the two pairs of socks instead of between the socks and the feet.

If any part of the foot feels sore, even though the skin is not broken, it is a good plan to search the inside of the boot with the fingers for any roughness or projections, which, if found, should be promptly attended to by the shoemaker.

Changing into canvas shoes after a march rests the feet enormously and allows time for the boots to be aired and dried.

Special attention should be paid to the care of the socks and boots. The latter must be kept soft with dubbin. Slight alterations to the boots themselves, such as stretching if they press unduly upon any part of the foot, should be undertaken if necessary.

Wet boots should be changed as soon as possible after a march, and arrangements made for drying them slowly, after which they should be dubbined. It is often a good thing to vaseline the boots while they are still warm from the feet. The pores of the leather absorb more while in this state. Waterproofing should be avoided. It is apt to make the boots too impervious and to confine the sweat inside the boot, thus acting as a poultice and softening the feet.

The socks must be kept clean and dry and any holes smoothly darned without ridges or lumps.

Dirt not only causes stinking feet, but it is the source of most, if not all, of the inflammatory swellings and abscesses which affect unclean feet. Such disabilities totally incapacitate the soldier from marching, and frequently cause blood poisoning with consequent danger to life and limb.

A change of socks should always be carried, at least two pairs of socks being kept in use. In barracks these can be changed once a day or worn on alternate days and washed once a week.

Socks should always be changed at the end of the day's march, the used pair being washed, dried and well rubbed to make them soft. If it is not possible to wash them at once, at least they should be hung up to air and dry, and washed as often as time and opportunity permit.

If the feet and socks are kept clean and properly fitting boots are worn, the common ailments of the feet will soon cease to be troublesome.

A simple device for lessening the friction between the foot and the sock is a leather strap and buckle. The Coindreau strap, as used by the French army, is recommended (Fig. 9). It is ⅛ inch thick, fully ½ inch wide and 29 inches long. The strap is passed as a figure of eight, under the foot, over the instep and buckled off over the outer ankle bone. This so lessens friction that a man with a blistered foot can often march in comfort. The strap can be improvized from a puttee or bandage.

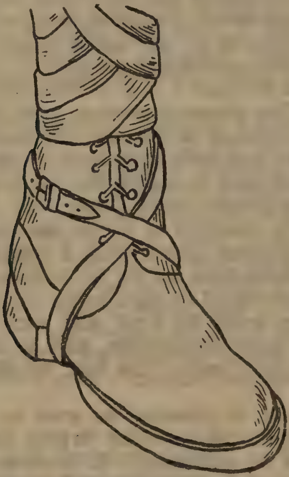


Fig. 9.

Care of the feet during the march.—At any long halt men known to suffer from defective feet should be rounded up by the foot orderly, and if they are complaining their boots should be removed and treatment given on the spot. Elastoplast is invaluable in these circumstances and should be stretched over the sore place. At the same time the inside of the socks should be well sprinkled with foot powder. This produces a gloss on the surface of the elastoplast which prevents it rucking up.

If elastoplast is not available, zinc oxide plaster applied in the same way may be used instead. Never use ordinary adhesive plaster.

Care of the feet after the march.—The following routine should be carried out at the end of the march. While it may sometimes happen that the whole of this routine cannot be carried out daily, it should be adhered to as far as possible and the consequent reduction in sore feet will be most marked.

1. Remove boots, dry and dubbin.
2. Wash and dry socks, rub them until soft, darn, but leave no ridges.
3. Wash feet in cold water, rub with spirit, or alum solution, treat blisters, abrasions, etc., dust with foot powder.
4. Put on clean socks and canvas shoes.

N.B.—A useful foot powder is—

*Pulvis Zinci Compositus cum Acidi Salicylas (N.W.F.)
Synonym foot powder

Salicylic acid in powder ..	gr. 10
Zinc oxide	gr. 380
Boric acid in powder ..	gr. 190
Talc of commerce in very fine powder	gr. 19
Kaolin, previously dried to	gr. 960

or—

Zinc oxide (in fine powder) ..	1 part
Pulv. kaolin ..	7 parts

* Strict economy is essential in prescribing this preparation.

It has been found useful to train one man a company or equivalent in routine foot treatment, and to make him responsible for the care and treatment of men on the march, the paid foot orderly being employed in getting men's feet fit for marching and in any special treatment which may be required.

CHAPTER 5

AFFECTIONS OF THE FEET

Hyperidrosis or sweaty feet.—In a unit it will generally be found that a number of men suffer from a condition known as hyperidrosis or sweaty feet. On the march this condition readily leads to tender, inflamed and chafed feet, and it is therefore essential to discover such men and have their feet attended to in time to prevent casualties on the march. Daily inspection of their feet is necessary, and immediately after arrival in camp or quarters at the end of a march a further inspection is required.

Treatment for this condition consists in washing the feet with a 0·5 per cent. solution of formaldehyde or other suitable antiseptic solution. The feet are then dried and powdered with a powder of a mild antiseptic nature. A suitable powder is mentioned in the previous chapter.

Bromidrosis.—A condition giving rise to foul-smelling feet (bromidrosis) occurs in some men and is really an exaggerated form of hyperidrosis. It may be treated as follows :—

The soldiers' footwear is disinfected : the socks, by soaking them for one hour in 2½ per cent. cresol solution, or 1/2000 perchloride of mercury solution, followed by rinsing them in hot water and finally washing them ; the boots, by painting the insides with a 25 per cent. solution of salicylic acid in methylated spirits. The feet, over the whole of the red areas of the soles, heels and sides, and not omitting any red patches which may be found under and between the toes, are then washed, dried and painted with the same solution diluted with an equal amount of methylated spirits. When the spirit has evaporated a clean pair of socks should be put on.

Inflammation.—Whenever a portion of the body is injured or irritated in any way, certain changes occur at the injured place, associated with an increased flow of blood to the part. This is characterized locally by redness, swelling, heat and throbbing pain, and the condition is called " inflammation."

The causes of such inflammation may be :—

(i) The rubbing by a seam in the boot, a wrinkle or knot in the sock, some grit in the boot, etc.

(ii) Burning, scalding, frostbite, chilblains, trench feet, etc.

(iii) Germs, which play a great part in the irritation and offensiveness of dirty feet. These germs, invisible to the naked eye, thrive in moist, warm, dark and dirty places, such as unwashed feet, and not only irritate the feet when softened by the heat and perspiration of marching, but enter cracks and wounds in the feet and give rise to inflammation, formation of pus (abscess) and general blood-poisoning.

Treatment.—The treatment of swollen and inflamed feet is, first of all, to remove the boots and socks. If possible, the feet should then be placed in warm water for a few minutes, or, at any rate, washed and well dried. The only drawback to warm water is that, though it eases the pain, it has a temporary softening action on the feet, and therefore must not be used just before the march. It does no harm the night before or after a march. A clean pair of socks and a dry, easy pair of shoes or slippers, and a rest with the feet raised will usually set matters right in mild cases. But when the feet are easily inflamed and readily become tender, precautions should be taken before the next march. The feet and socks should be kept clean and dry, the boots roomy and soft. The soles of the feet and the socks may be soaped, or the feet greased with zinc, or other ointment. The feet may be hardened by soaking in alum water (two teaspoonsful to the pint), tannic acid 1 per cent. solution, etc.

The powder recommended on p. 21 of Chap. 4 should be sprinkled over the feet and between the toes before the sock is drawn on.

Blister.—A blister consists of a collection of fluid under the horny layer of the skin which becomes detached from the mucous layer and raised above the level of the surrounding skin. The size and shape depend upon the nature and severity of the cause which brought the blister into being. In the foot the blister is most often met with under the heel or just above it, and is caused by some internal projection or by to-and-fro or up-and-down friction in a too large or badly-laced boot. In other cases blisters are met with on the sides of the feet or where one toe rubs the next.

Treatment.—If the source of irritation which caused the blister is removed, and the blister left to itself (the foot being rested), the fluid will be gradually absorbed and all will be well, and the raised layer of skin will not be rubbed off until that beneath has become hard enough to replace it. This natural cure may be much hastened.

In treating a blister the following routine should be adopted :—

Take off the boot and sock, search for the cause of the blister, and remove the cause. Often it is found to be some projecting seam or wrinkle in the lining of a boot. If it should be the curled-up edge or a hole in a sock, the sock should be changed or suitably darned, or, failing that, after greasing the foot with zinc ointment, it may be advisable to dispense with the sock and replace it by a cloth or paper foot-cover.

Next, the fluid must be drawn from the blister. This is done with a clean needle or sharp-pointed knife previously sterilized by passing through a flame. The needle or knife blade is inserted into the sound skin about an eighth of an inch beyond the edge of the blister and is then passed horizontally into the blister and raised to allow the fluid to run out beneath it. When the fluid is removed, the skin protecting the blister is carefully flattened down but not cut away, and the area painted with iodine. Over this, place a piece of lint and secure it in position with adhesive strapping. This will protect the tender layers of the skin from pressure or injury until such time as a new horny layer has formed beneath that raised by the blister and is able to take its place. Should the blister refill, the operation should be repeated.

Abrasion.—An abrasion is an injury to the superficial layers of the skin caused by grazing or rubbing, and not associated with blister formation.

Treatment.—An abrasion should be treated without delay in order to prevent it passing into the more severe condition of an ulcer.

After removal of the cause, the abrasion should be painted with tincture of iodine or covered with zinc oxide ointment or iodex, and protected by a piece of sterilized gauze or lint kept in place by adhesive strapping.

Ulcer.—If an abrasion extends deeper into the third layer, or true skin, an ulcer results. This may be produced by more severe friction than that which caused an abrasion, or may supervene after a wound or cut produced, perhaps, by a sharp stone or piece of glass. Other types of ulcers are local manifestations of some disease, and such ulcers get worse so long as the original cause remains, but, if the cause is removed, the skin round the edges of the sore becomes very energetic and gradually grows inwards over the surface of the ulcer. For this to happen, however, the ulcer must be clean and free from germs. If dirt and germs are allowed to get in and stay there, they set up irritation and inflammation, prevent healing, and may even pass to the deeper tissues and spread thence via the lymphatic channels to the bloodstream, thus causing general blood poisoning. For this reason scrupulous cleanliness of the ulcer and the skin around is absolutely necessary.

Treatment.—The medical officer should always be consulted regarding treatment when an ulcer develops.

The first thing to do is to ascertain and get rid of the cause. If the ulcer is a local manifestation of some disease it will be necessary for the medical officer to diagnose and treat the disease. If the treatment of the disease is successful and the ulcer is kept clean and guarded from irritation, it will heal.

Should the ulcer be the result of local irritation, from a boot, sock, etc., the cause of the irritation must be disposed of, the ulcer cleaned up with a suitable antiseptic lotion and then covered over with sterile gauze or lint. The application of a suitable lotion or ointment may sometimes hasten cure.

Wounds (punctured).—These wounds are mentioned separately to impress their importance upon the foot orderly. When a sharp thorn, nail, pin, etc., is run into the foot, the seriousness of the wound is often greater than the actual injury would appear to warrant. The reason is that some dirt, containing poisonous germs, may be carried into or below the skin and left there, or a piece of the thorn or nail itself may be left behind. Such material, deep in or under the skin, will set up inflammation and an abscess may develop, but if the puncturing instrument is quite clean and free from germs no such condition will arise. The hard, thick skin of the sole prevents pus formed under it from escaping outwards and the small external opening usually closes and disappears. This pus may burrow and give rise to serious damage to the sole of the foot. On the other hand, this same thick skin is a great protection from injury, as the thickness is in the superficial horny layer. Punctures into the horny layer are not serious ; those extending through the mucous layer into the true skin may be exceedingly serious and need medical supervision.

Treatment of wounds.—Open wounds and cuts must be kept clean and free from germs. If of any size they should be shown at once to the medical officer, who will decide upon the nature of the treatment. In his absence, or if of a trivial nature, they should be washed with a suitable antiseptic lotion and then be protected by a dressing of sterilized gauze and a bandage. Where the above materials are not available for the immediate treatment of a wound, it is best to wash away any dirt or blood with clean, boiled water and protect the wound with a clean piece of cotton or linen until such time as proper lotions and dressings can be obtained.

The same principles apply to punctured wounds, but, for the reasons already explained, such wounds involving the deep layers of the skin should always be brought to the notice of the medical officer, as it may be necessary to open them up to get rid of dirt, etc., or to allow of free drainage of pus.

Bleeding or haemorrhage.—To stop bleeding from wounds the local application of gauze covered with cotton wool and a firm bandage will usually suffice. Should this fail to arrest the haemorrhage it may be necessary for the medical officer to ligature the cut blood-vessel.

Abscess.—An abscess is an enclosed collection of pus. It may form under any of the layers of the skin or in the deeper parts. It results from infection of the tissues by germs, which usually have gained their entrance through the skin. The germs first set up inflammation which goes on to destruction of the tissues and abscess formation. It is characterized by acute throbbing pain, tenderness, redness, local heat and swelling. When handled, a fluctuating feeling due to the collection of fluid matter (or pus) under the skin can usually be made out.

Treatment.—As treatment entails cutting to let out the pus, the services of a medical officer should be called in. The operation is not so simple as in the case of a blister, and if performed without knowledge and skill important structures may be cut.

It sometimes happens that the abscess comes to a head and bursts without surgical interference.

Once the pus is released free drainage should be ensured and the local application of hot fomentations or eusol dressing usually hastens discharge of the pus and healing of the abscess.

To ensure free drainage it may be necessary to pack *lightly* the abscess cavity with strips of sterile gauze.

The surface should then be dressed with a few layers of sterile gauze under cotton-wool to absorb the discharge. The dressings are kept in position by a bandage and should be changed and the abscess dressed, as and when directed by the medical officer.

The majority of cases of abscess should be kept in bed.

CHAPTER 6

CORNS AND THEIR TREATMENT

Corns are localized outgrowths of the horny layer of the skin with a central ingrowth from the same layer of a hard, horny plug. They are caused by intermittent pressure from badly-fitting boots, and are most commonly met with in those who wear boots with narrow, pointed toes.

Two kinds of corn are described, viz., the " hard " and the " soft." Hard corns are usually met with on the top and sides of the toes, on the heel, under the tread of the sole, and occasionally on the ends of the toes. Soft corns are most commonly found between the toes and are ordinary corns whose surface is softened by sweat.

Occasionally a minute bag of fluid may collect under an old and thickened corn. Such a corn is very liable to become inflamed and pus may form in the small space beneath the corn. Owing to the hardness of the corn this pus cannot escape or come to a head and the case should be dealt with by the medical officer.

A corn not infrequently forms over a bunion and in this site proves a most painful condition.

Treatment.—As corns result from undue and intermittent pressure on some small part of the skin, the first thing necessary towards a cure is to remove that pressure. The rectification of the offending boot, if combined with the removal of the corn, will lead to a cure ; but it is no use removing the corn without putting the boot right. First, therefore, investigate and remove the defect in the boot, then proceed to operate on the corn and remove it. Before doing this, the corn should be treated by painting it daily for a few days with a paint consisting of—

salicylic acid	60 grains.
collodium flexile	1 ounce.

This helps to remove the thickened layers of skin and makes the extraction of the horny core easier. In dealing with a corn the patient should be placed on a high chair in a good light. The foot orderly seats himself at a lower level and places the patient's foot on a towel on his knee. He next examines the foot and corn thoroughly and makes up his mind regarding the extent to which he will operate. The foot orderly now selects a sharp knife with an even, flat blade about 1 inch to 1½ inches long, grasps it firmly in the right hand as he would hold a dinner knife, and not as a pen is held, the blade being horizontal with the fingers over the handle. The end of the handle may be passed between the fourth and fifth fingers to aid in steadying it. The pad of the thumb is pressed firmly against the back of the blade at its junction with the handle.

He next grasps the foot or toe firmly with the left hand in such a way that it fixes the side of the corn nearest to him with the thumb. Holding the blade of the knife horizontal, the edge being slightly depressed as in using a razor when shaving, he gradually shaves or pares away the extra horny material that has been formed and still remains in the superficial layer (Fig. 10).

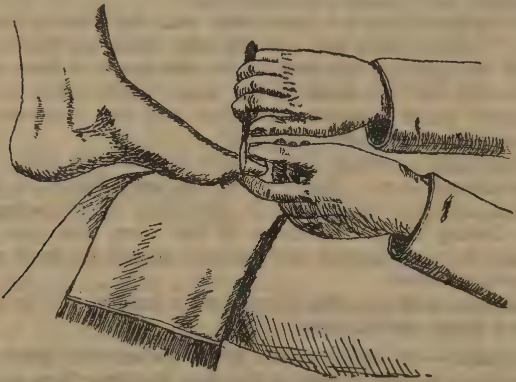


FIG. 10.

Method of using knife when removing (*i.e.* paring away) a corn.

This operation should be done slowly and evenly, using the centre of the blade and not its point, until the skin over the place has become the same colour and thickness as the surrounding skin. Remember that the corn has formed in the superficial horny layer, and on no account must the foot orderly go deeper than this or wound the mucous layer, or true skin, underneath. Any bleeding which takes place is a sure indication that he has gone too far. Should it occur, he must treat the condition as a wound by washing the place with some mild antiseptic lotion, sprinkling on it a little antiseptic powder and covering with wool and strapping or a bandage. If the foot orderly wounds the skin in this way and it becomes inflamed he will be blamed, and if it gets poisoned and an abscess results he will not easily escape the consequences. He should therefore be very careful to hold and use the knife in such a way as to remove by successive thin shavings, only the corn. The horny core of the corn can be picked out with the point of the knife or other suitable instrument.

The foot orderly should never operate on an inflamed corn, but should first reduce the inflammation by hot fomentations; such cases should be shown to the medical officer as soon as possible and he alone should deal with them. In the meantime a piece of lint, soaked in antiseptic lotion and covered by jaconet and a bandage, should be applied.

In dealing with soft corns between the toes, the foot orderly should aim at relieving pressure, and at the same time absorb the sweat and remove the corn. Wider toes to the boots, and cotton-wool ring-pads between the affected toes to prevent them being squeezed against each other and to prevent pressure on the corn, all give relief. Soft corns should be scraped away in a similar manner to hard corns, but care must be taken not to cut the adjacent toe or the folds of skin at the root of the toes. Instead of operating, a corn plaster may be put on the corn and fixed with strapping. Two or three days later the foot should be soaked in hot water and in some cases the corn will easily peel out. Corns on the soles of the feet can be relieved by the following method :—

Wear an inner cork sole in the boot and cut in the cork, immediately below the corn, a shallow excavation, with shelving edges. The hole in the cork may be filled with powdered salicylic acid which will soften the corn.

Adhesive felt is useful in relieving pressure on a corn both before and after operation.

Athletes' foot.—In this condition a fungus attacks the skin usually between the fourth and fifth toes.

Differentiate this condition carefully from a soft corn. The latter is localized and tender on pressure. The former is a diffuse inflammation with a thin layer of white skin overlying red, inflamed tissue. Refer all cases of athletes' foot to a medical officer.

CHAPTER 7

THE FORMATION AND FUNCTION OF NAILS—CARE OF THE NAILS—NAIL AFFECTIONS AND THEIR TREATMENT

Nails are appendages of the skin consisting of modified horny cells firmly welded together. They are rectangular horny plates, with a dorsal convexity, and are somewhat thicker at the free end than the base. They rest upon a furrowed bed, and from this, as well as from the fold of skin in which the proximal end, the root or matrix, is embedded, new cells are being continually added. Therefore nails grow in length by additions from the root, and in thickness by additions to their under-surface throughout the length of the nail bed.

The base or root of the nail is hidden by a fold of skin which grows over it, and this fold is continued for a varying distance along the sides of the nail as a lateral wall, and between this wall and the nail is the " nail groove " or " sulcus " (Fig. 11).

Nails form a natural protection to the ends of the toes and are useful when the foot is bare, but when it is encased in a badly-fitting boot the nails may thicken and give rise to trouble in various ways.

Care of the nails.—In principle toe-nails should not be cut like finger-nails ; that is to say, the middle of the free edge should be straight and not convex (Fig. 12).

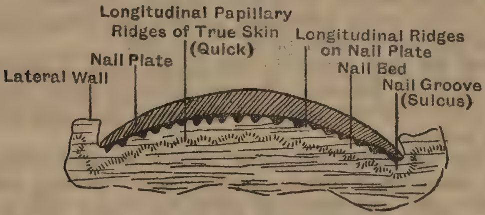
They should not be cut too short ; the result of doing this is the sinking of the nail plate below the level of the supporting skin at the end of the toe.

On the other hand, a too long nail may increase the bulk and length of the toe and give rise to pain and discomfort.

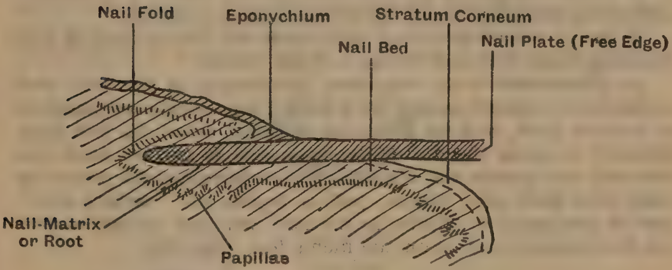
When there is a predisposition to ingrowth of the nails at the sides, the cutting of a V-shaped piece out of the centre of the nail may possibly be of service ; this is undoubtedly beneficial if the nail is of thin consistency, but with a thick nail it is unlikely to effect much improvement. However much care is expended on the nails, shortness or narrowness of socks or boots will eventually cause trouble with them. Excessive toe-crowding from any cause will give rise to nail trouble, and in men with such a tendency the toes may be kept apart by strapping carefully adjusted around each toe, or lint may be placed between and around the toes.

Nails may be the seat of various troubles :—

(*a*) **Inflammation** is usually due to infection. This infection commonly commences in a small fissure in the nail groove, caused by a slight injury or by an ingrowing nail. The inflammation may result in complete separation or loss

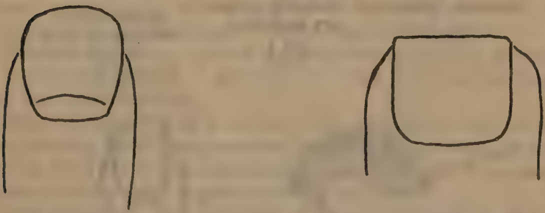

Longitudinal Papillary Ridges of True Skin (Quick)
Nail Plate
Lateral Wall
Longitudinal Ridges on Nail Plate
Nail Bed
Nail Groove (Sulcus)

NAIL PLATE (Transverse Section)



NAIL PLATE (Longitudinal Section)

FIG. 11.



Finger-nail

Toe-nail

FIG. 12.

Cutting a toe-nail. The nail should be cut at right angles to its long axis—not in a curved manner, like finger-nail.

of the nail. If, however, the inflammation has not been too severe a new nail will grow and replace the lost one.

In some cases although a new nail develops it may, as the result of the inflammation, be deformed and irregular.

Treatment.—The same principles govern the treatment of inflammation here as in other parts of the foot.

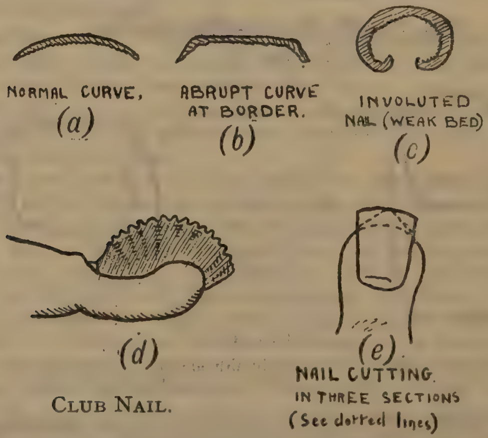
First search for and ascertain the cause, and, if possible, remove it. It may, however, be necessary to allay the inflammation before you can deal with the cause, as in some cases of ingrowing toe-nail.

To allay the inflammation, either before or after removal of the cause, thoroughly cleanse the foot and offending toe by trimming the nails and washing with hot water and soap, followed by a suitable antiseptic. Then apply hot fomentations and rest the foot in a raised position.

If the wearing of a boot or shoe causes pressure or pain it should be discarded until the inflammation subsides.

If the condition is severe and there are indications of pus forming, show the case to the medical officer.

(*b*) **Club-nail** is an abnormal thickening of the nail and results from injury caused by a blow, the continuous pressure of a short boot, or from down-hill walking, when the foot slips forward towards the toe of the boot and so presses back the toe-nail and injures the matrix. It not infrequently occurs in men who look after horses, and is known as "ostler's toe," and is produced by injury to the nail bed and matrix caused by the horses treading on the men's feet (Fig. 13).


NORMAL CURVE, (a)
ABRUPT CURVE AT BORDER. (b)
INVOLUTED NAIL (WEAK BED) (c)
(d)
(e)
NAIL CUTTING IN THREE SECTIONS (See dotted lines)

CLUB NAIL.

FIG. 13.

Treatment.—If there is inflammation under the nail it may be necessary to have the nail taken off by a medical officer. If no inflammation, the nail should be pared down with a knife and then smoothed off with a file, without weakening the nail too much, the idea being to reduce all protuberances and make the nail conform as much as possible to the normal. Unless absolutely necessary, do not interfere with the undersurface of the nail or cut the sides, as such action may ultimately create trouble.

(*c*) **Ingrowing toe-nail.**—This extremely painful condition usually affects the great toe. It is the result of wearing too small socks, or boots with sharp-pointed toes, when the soft skin of the inner side of the toe is pressed against the edge of the nail ; or it may result from cutting the nails in the wrong way. Toe-nails should be cut straight across at right-angles to their long axis. The sides should not be cut away from the nail groove, otherwise the natural rolled edge of the nail is destroyed and a sharp edge is left which cuts into the skin of the nail groove. A chronic painful fissure is formed at the side of the nail which causes considerable discomfort.

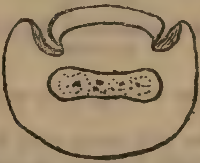


FIG. 14.

The toe-nail on coronal section. Note the infolding of the nail edge and the special epithelium with which it makes contact.

If the condition is allowed to continue pus may be formed, and, not infrequently, a growth of proud flesh under the edge of the nail will develop.

Where the services of a skilled foot orderly are not employed in an infantry battalion cases of ingrowing toe-nail are usually common, and as the condition causes acute pain the marching efficiency of the unit is greatly interfered with.

If you examine the nail fold (Fig. 14), it will be seen that nature has provided against the condition of ingrowing toe-nail.

Firstly, the edge of the nail is curled upon itself so that a convex surface is opposed to the skin surface. Secondly, the skin in contact with the nail edge is of a more horny texture than that around. These safeguards are present in both fingers and toes, but, owing to the greater relative pressure the toe-nails have to bear, they are more highly developed in the latter situation.

There are two remedies for ingrowing toe-nail which may be tried if the condition does not require removal of the nail.

(1) The nail groove may be protected by restoring the convex nail edge by wrapping around the offending edge a small, oval-shaped piece of tinfoil. The tinfoil is so arranged that a fraction of it lies on the under-surface of the nail, the remainder on the upper surface. It is kept in position by a drop of sterile glue or strong collodion (Fig. 15). The tinfoil should be sterilized by boiling it in water for three minutes before use.

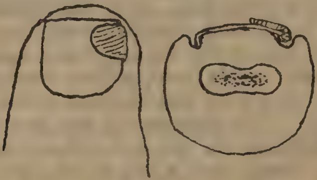


FIG. 15.

The method of tinfoil application in the treatment of ingrowing toe-nails.

The pressure on the soft parts may be further relieved by drawing them away from the nail by means of a narrow strip of elastoplast encircling the toe.

(2) The second simple remedy is known as Webb's wire, which acts by maintaining a constant separation between nail fold and nail edge.

Should inflammation be present it is treated in the usual way, but if the condition has advanced to abrasion or ulceration, a light gauze packing soaked with a spirit solution of one of the aniline dyes should be applied, the nail edge being kept from the raw surface by one of the methods described above.

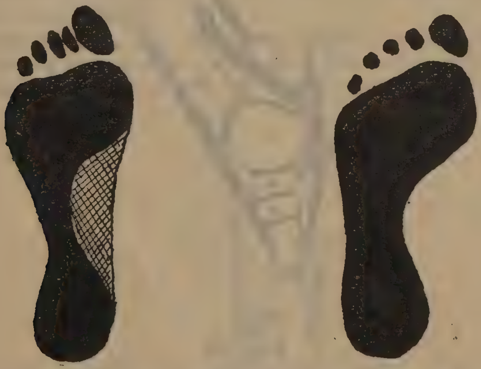
Exuberant proud flesh should be removed by rubbing it lightly with copper sulphate (blue stone). If the nail continues to irritate and the condition does not improve the case should be handed over to a medical officer, who will, if he considers it necessary, remove the nail under a local or general anaesthetic and order suitable dressings until a new nail grows.

CHAPTER 8

FLAT-FOOT—HALLUX VALGUS—HAMMER-TOE—BUNIONS

A mild degree of flat-foot is frequently seen in young soldiers. The commonest cause in adults is prolonged standing, particularly in the attitude of " attention," and overstrain of the feet and legs, whereby the muscles become exhausted. In many cases faulty boots and shoes contribute to the mechanical strain. The feet are turned out, and there is a marked prominence of the inner side of the ankle bone and the inner bones of the foot immediately in front of it. The weight of the body is allowed to rest almost entirely on the inner border of the foot.

However produced, the deformity is characteristic (Figs. 16 and 17).



(*a*) (*b*)

FIG. 16.

Prevention and Treatment.—In order to prevent the cases of flat feet which occur in a percentage of recruits during the first few weeks of their training, it is necessary to bear in mind the causes which underlie this weakness, viz., the wearing of faulty footwear, particularly by those who have to stand about for long periods and unaccustomed exercise in those who followed sedentary occupations in which the foot and leg muscles were not exercised.

Having provided the recruit with suitable boots and shoes, it is necessary, during the first four to six weeks of training to

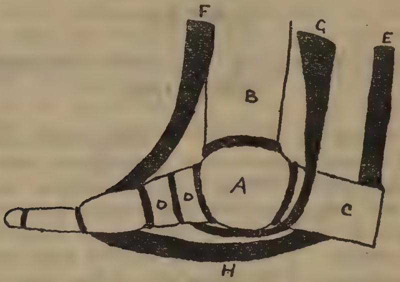


FIG. 17*a*.

Diagram of flat-foot. The supporting muscles have yielded and the unsupported keystone has slipped down and rests on the ground.

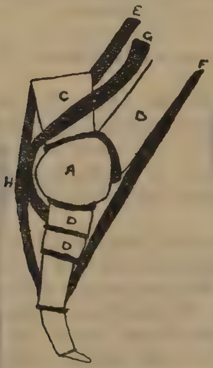


FIG. 17*b*.

Flat-foot on tip-toe. Notice that the sole of the foot instead of becoming more hollow in this position tends to bulge.

spare the feet and strengthen the foot and leg muscles. This is done by :—

(1) Short periods of drill with frequent changes of instruction whereby the recruit is able to get off his feet.

(2) Avoid standing for long periods at one time in the attitude of "attention."

(3) When standing " at ease " teach him to " toe-in " and rest the weight of the body equally on both feet. This transfers the weight from the weak inner to the strong outer border of his feet.

(4) Teach the correct way to walk. Men should walk with the inner border of boots parallel. " Toeing-out " should not be permitted.

The following setting-up exercises will do much to strengthen the muscles and prevent arch trouble and should be practised daily.

Exercise 1.—Correct standing position. Feet parallel. Lift inner side of foot keeping big toe firmly pressed on to the ground.

Exercise 2.—Feet parallel, ankle bones pressed together, heels raise and slowly lower.

Exercise 3.—Correct standing position, buttock contractions to rotate knees outwards and shift body weight on to the outer borders of feet.

Exercise 4.—Crossed leg sitting. Alternate feet, full plantar flexion, turn foot in fully and finally keeping foot turned in, cock up ankle.

Exercise 5.—Teach correct heel toe walking with toes straight to the front.

Hallux Valgus.—By the term " hallux valgus " is meant a deviation of the great toe away from the mid-line of the body towards the other toes (Fig. 18). Modern sharp-pointed boots

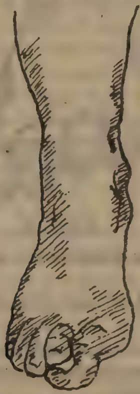


FIG. 18.

A hallux valgus deformity of the great toe.

and shoes and short footwear are the chief factors in causing this deformity. In the majority of cases hallux valgus is accompanied by flat foot and bunion.

Treatment.—The boot must be of the proper shape and size with a straight, inner edge. Where the prominent head of the first metatarsal impinges upon the upper, the boot must be softened or even cut away and a specially thin piece of material inserted. It is wrong to allow the pressure upon the tender prominence to be continued, as this will only increase the development of the bunion and accentuate the deformity.

An extremely useful measure is the attachment of a metal bar ½ inch broad and a ¼ inch in depth to the under-surface of the sole. It is placed like the bar of a football boot, across the sole, immediately behind the metatarso-phalangeal joint, and it gives great relief because it takes the body-weight off the affected and painful joint. The introduction of a suitable pad or toe-post between the great toe and its neighbours is sometimes effective. Severe deformity can only be rectified by surgical operation. The associated flat-foot and bunion will also require appropriate treatment.

Hammer-toe.—This condition usually affects the second toe because it is the longest of the outer four and is liable to be displaced and cramped if any lateral displacement occurs in the great toe (Fig. 19).

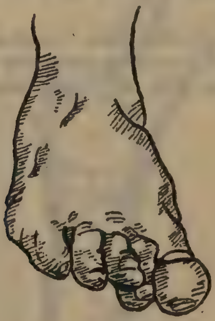


FIG. 19.

A hammer-toe deformity affecting the second toe of the right foot.

The deformity is a pronounced bending of the second joint. The usual cause is a badly-shaped and centrally-pointed type of sole to the boot or shoe.

Treatment.—If the case is a simple one, treatment by what is termed " the cradle method " may be effective if persevered in. It is carried out by means of two narrow strips of adhesive plaster applied as follows (Fig. 20*a*) :—

(1) The proximal strip passes over the dorsum of the proximal phalanx of the affected toe and under the proximal phalanges of the two adjoining toes thus :—

(2) The distal strip passes under the terminal phalanx of the affected toe and over the dorsum of the terminal phalanges of the two adjacent toes :—

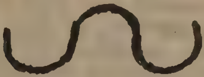


FIG. 20. (*a*)

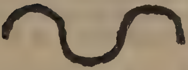


FIG. 20. (*b*)

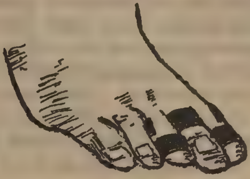


FIG. 20 (*c*).

A hammer-toe (second toe) deformity treated by the " cradle " method.

The method is simple and comfortable and the improvement is progressive, as with each step the patient takes there is a stretching of the contracted tissue and an improvement in the position of the parts.

In all probability, however, operative treatment will be necessary to effect a cure in the case of adults.

Bunions.—Protecting the great toe joint at the head of the first metatarsal bone is a water-cushion called a " bursa." When a pointed boot presses the great toe inwards and produces a hallux valgus it also presses on this bursa and irritates and inflames it. As a result the bursa becomes enlarged, its walls thickened and the fluid increased in amount. This condition is known as a " bunion." Occasionally inflammation may go on to the formation of pus and an acute and painful abscess results. After a time, if not remedied, the joint adjusts itself to its new position and becomes permanently fixed there, and, from constant pressure and irritation the bones around the joint become enlarged. The condition is a very painful one and once it has developed tends to get progressively worse.

Treatment.—Inflammation should first be treated by rest and application of hot fomentations.

Fitting of wide soled boots with roomy square toes will relieve the local pressure.

CHAPTER 9

CHILBLAINS—FROSTBITE—TRENCH-FOOT

Chilblains.—These are most commonly met with on the toes and heels. The skin becomes congested, swollen, thick and brawny in one or more circular patches, with severe itching and burning pain which are increased by the heat of a fire or by exertion. The skin over these patches is at first red in colour, then crimson and finally purple or livid. If very severe, fluid may exude beneath the skin and a blister form; this may break and an unhealthy abrasion or even an ulcer result.

Treatment.—Where chilblains threaten, the circulation of the skin should be encouraged by gentle rubbing, by a judicious amount of exercise and by wearing roomy, dry, warm socks and boots.

It is an advantage to entwine cotton-wool loosely round the base of the toes in such a way that it will provide greater freedom for the ends of the toes and prevent direct contact of the toes with one another.

Sitting over the fire (after getting the toes chilled), in wet, cold boots should be avoided. The chilblains may be dressed with zinc ointment, and protected with cotton-wool. Lead and opium plaster on washleather is also a good dressing. Night socks may be worn.

Weak tincture of iodine is useful in relieving congestion in the early stages.

If the skin is tense and shows signs of breaking, Friar's balsam should be applied. The balsam should be gently rubbed into the affected part two or three times daily or applied spread upon lint.

Broken chilblains should always be treated with suitable antiseptics to prevent them becoming infected with germs. They may be fomented with hot fomentations. Should a blister form, the fluid must be evacuated and the place dressed with antiseptic ointment and a protection of soft cotton-wool applied. Any sign of an acute extending inflammation is a serious matter, and one which should at once be brought to the notice of the medical officer.

Frostbite.—Frostbite is produced by severe cold, especially when combined with strong wind and a high altitude. It occurs rapidly on exposed skin surfaces and may develop instantaneously if a very cold metal surface is allowed to come in contact with the unprotected skin, *e.g.* if the rifle trigger is touched by the bare finger. When this happens, pain similar to that caused by a wasp sting may be felt. The affected area of skin looks white and waxy and a warm hand applied to the part for a few minutes will relieve the condition in many cases. Personnel in cold zones should watch each others' faces for the first sign of a white patch.

When unexposed skin is affected the onset is more gradual. First there is an unpleasant feeling of extreme coldness, then the feeling of cold dies away and the part becomes numb. This stage is one of great danger to the unwary who may think that, because they are no longer in pain, the danger is past. When frostbite occurs in this way, the skin may still look normal or may be white and waxy in appearance. If the toes are affected, the movements of the joints are stiff.

When thawed, the affected part becomes red and swollen, like a chilblain, and in severe cases the skin darkens and blisters containing yellow serous fluid, or even blood, may form.

Frostbite occurs chiefly in the parts of the skin that are exposed and in the parts of such skin which cool most readily.

Frostbite of the feet occurs less frequently than of the fingers, ears and nose, for the circulation in the feet is generally maintained in action by walking.

The feet will suffer if they are kept still in very cold air or in snow for long periods for, when at rest, the feet cool as quickly as the hands.

Anything which interferes with the circulation increases the chance of frostbite.

Prevention.—As a general preventative measure, the importance of adequate clothing cannot be over-emphasized. Regular exercise encourages the circulation, and garters, tight boots, socks or puttees must not be worn as they restrict the circulation in the feet. Two pairs of socks should be worn provided that the boots can take them with ease ; if they are not large enough, however, it is better to wear only one pair of socks. Tight socks are almost as dangerous as tight boots ; boots should be unlaced at every opportunity.

Treatment.—The affected part must be allowed to thaw slowly. Rapid thawing causes much pain and great swelling and destruction of tissues. Therefore ***never apply heat*** greater than body temperature. *Do not rub with snow : Do not rub the part at all.* If you do, you will do no good and will increase the harm done to the already damaged tissues.

When dealing with a case of frostbite :—

1. Keep the affected limb absolutely at rest. If the foot is

affected, a stretcher should be used to transport the patient to shelter.

2. Clean the foot thoroughly but *very gently*, and paint with 1/1000 solution of acriflavine.
3. Wrap up loosely in many layers of cotton-wool.
4. Keep the patient warm and give him hot drinks.
5. Cases should be referred to the medical officer without delay for further treatment.

Frostbite of the hands or feet is sometimes followed by loss of finger or toe nails.

Trench-foot.—This condition is similar in many ways to frostbite of the foot, but a freezing temperature is not necessary for its production.

It is caused by prolonged standing in cold water or wet, slushy mud, or the continual wearing of wet socks and boots when the weather is cold. Anything which depresses the vigour of the circulation such as fatigue, want of exercise, or the wearing of tight boots and socks, adds to the risk of trench-foot in the same way as in frostbite.

Trench-foot develops gradually, and the early stage may escape notice. In the common form, as seen at the aid-post in the last war, the foot is swollen, sometimes enormously; it is usually painful, the skin is glazed and flushed and blisters may be present. In a few cases the foot is pale and cold but not swollen, and the patient suffers from severe neuralgic pains.

Treatment.—All cases of trench-foot should be treated in bed with the feet elevated.

After careful washing with a soap mixture made up of soft soap, turpentine liniment and tepid water, the feet should be swabbed with an antiseptic lotion and liberally dusted with an antiseptic powder. The toes should be separated by strands of sterilized gauze.

If the feet are pale and cold, they may be wrapped lightly in layers of cotton-wool; if hot and swollen, they should be exposed to the air and an evaporating lotion applied.

As the pain and tenderness pass off, gentle massage, followed later by mild exercises, is indicated.

In severe cases, blisters should be drained aseptically and the skin surface painted with 1/1000 solution of acriflavine.

If gangrene of the toes develops, strenuous efforts must be made to keep the affected parts absolutely dry by using antiseptic dusting powder.

Prevention.—General measures consist of drainage of wet trenches where possible and the provision of duckboards to keep the feet out of water and mud. Warmth, shelter, hot food and hot drinks also play an important part in preventing the occurrence of this condition.

The risk of trench-foot can be greatly reduced by careful attention to the feet both before entering and while actually in the trenches. Organized " foot drill " regularly carried out caused a tremendous improvement in the condition of the men's feet during the later winters of the last war. Foot drill can be best performed when men sit opposite one another in pairs. Each man removes his companion's boots and socks, and, if water is available, washes and carefully dries his feet. Any sores or abrasions found should at once be reported so that treatment by the medical officer or foot orderly may be carried out. Each man now rubs into his companion's feet a quantity of warm whale oil. It is no use just putting the whale oil on the feet ; it must be rubbed in until it has sunk into the skin and the feet are practically dry again.

After this has been done, clean, dry socks are put on and then the boots.

If organized foot drill is not possible each man should carry out the above routine for himself, both while in the trenches and when behind the lines, and should always carry a spare pair of clean, dry socks.

If long gum boots are issued, they should be put on while the feet are dry and socks should be kept up by a safety pin or other form of fastening to prevent them from working down the heel. On no account should garters or sock suspenders be worn round the leg.

Lastly, exercise is important as it helps to maintain the circulation in the feet. Even in conditions where " marking time " and " tip-toe exercises " are all that is possible, these movements should be carried out at frequent intervals.

N.B.—A more detailed account of the precautions to be taken against trench-foot and frostbite is contained in the Field Service Pocket Book, 1939, pamphlet No. 10, Sec. 14 ; the Handbook of Military Hygiene, 1941, Appendix VI ; and the Handbook on Clothing and Equipment required in Cold Climates (issued under the authority of the Director of Ordnance Services), 1941.

APPENDIX I

HINTS TO INSTRUCTORS IN CHIROPODY

The training of foot orderlies is arranged as directed in King's Regulations, 1940, para. 814. The course consists of a series of lectures and practical demonstrations given by an officer of the R.A.M.C., and is of 24 working days' duration. A certificate of proficiency is given to each man who qualifies.

Appendix II of this manual gives the suggested programme for a course of instruction in the subject. If possible soldiers who are to undergo training as foot orderlies should be selected from those classes who, in civil life, have had some experience of the actual work or of careful manipulation and attention to detail, such as masseurs, chemists, barbers, watchmakers, etc.

The three best methods of imparting knowledge are by (*a*) showing specimens or patients to the pupils, demonstrating the disabilities to the pupils and performing, and making them perform, the necessary treatment, manipulations, etc., (*b*) diagrams, etc., if you are able to draw, even roughly, by figures on a blackboard, and (*c*) testing the knowledge of the pupils by asking them questions. They will also learn much from lectures and by reading their text-books.

It is a good thing to set a practice paper at the end of each week, which they can answer out of hours. This accustoms them to do such work, tests their knowledge and gives the instructor some idea of each man's progress. In the final examination a large proportion (say, 50 per cent.) of marks should be given for actual, practical expertness, and the remainder for knowledge shown in a written paper and a short oral examination.

APPENDIX II

SUGGESTED PROGRAMME FOR COURSE IN CHIROPODY FOR FOOT ORDERLIES

Lecture 1. Elementary anatomy of the foot. Bones, arches, ligaments, tendons.
,, 2. The skin and its appendages.
,, 3. Coverings of the feet. Boots, socks, anklets and puttees.
,, 4. Deformities of the feet. Flat-foot, hammer-toe, hallux valgus, bunions.
,, 5. Treatment of the above.
,, 6. Care of the feet in barracks, camps and on the march.
,, 7. Sweaty and stinking feet, blisters and their treatment.
,, 8. Revisions of the first week's work, and questions upon it.
,, 9. Abrasions, ulcers, wounds, etc., and their treatment.
,, 10. Corns, their nature, types and growth.
,, 11. Treatment of corns.
,, 12. Thickened ingrowing nails and their treatment.
,, 13. Chilblains, frostbite and trench-foot.
,, 14. Treatment of the above. Prophylactic, special and general.
,, 15. Sprains, kicks and injuries, etc., and their treatment.
,, 16. Revision of the second week's work, and questions upon it.
,, 17. General revision.
,, 18. Work of the regimental foot orderly. Rules and regulations.
,, 19. Instruments, use and care of.
,, 20. Materials for treatment, *e.g.* dressings and lotions, etc. Their preparation and uses.
,, 21.
,, 22. } Practical work in treatment by members of the class.
,, 23.
,, 24. Examination. Practical, oral and written.

APPENDIX III

RULES AND REGULATIONS FOR REGIMENTAL FOOT ORDERLIES

Regulations.—A soldier may be employed as foot orderly in any unit of whose total establishment a minimum of 100 men are required frequently to travel several miles on foot in the course of normal regimental duty ; or in units of which the personnel are normally carried by animal or mechanical transport, *during periods of training, when the personnel of such units are required to travel several miles on foot daily,* subject to the decision of the G.O.C. in C. that the services of a foot orderly are necessary (*see* the Pay Warrant, 1940, para. 894, and footnote, as promulgated by Amendments (No. 29) notified in Army Order 6 of 1941).

The training of a foot orderly is carried out in accordance with King's Regulations, 1940, para. 814.

His duties are to teach men to look after their own feet and to treat such cases of minor disability as corns, blisters, ingrowing toe-nails, etc.

The regimental foot orderly will attend the medical officer's inspections of men, and all feet inspections by unit officers.

He will note in a book kept for the purpose, the number, rank, name, condition of the feet, and treatment of any men whose feet require attention (*see* Regulations for the Medical Services of the Army, 1938, para. 180 (*c*)).

Rules.

1. Keep the hands scrupulously clean and always inculcate in others and practise extreme cleanliness.
2. See that your knives are always sharp.
3. Never draw blood.
4. Avoid hurting your patient.
5. Confine your operations to the superficial (horny) layer of the skin and its modifications (nails, etc.).
6. Thoroughly examine the part before beginning to operate.
7. Never operate on an inflamed part.
8. When in the least doubt, appeal at once to a medical officer for advice.
9. Endeavour to persuade patients to remedy the causes of their disabilities.

APPENDIX IV

CONTENTS OF A CASE OF CHIROPODY INSTRUMENTS (1938 PATTERN)

(*See* Regulations for the Medical Services of the Army, 1938, Appendix 40)

File, nail and pick combined	No. 1
Forceps, dissecting	prs. 1
Hone	No. 1
Nippers, nail	prs. 1
Scalpels	No. 2
Scalpels, fish-belly	No. 1
Scalpels, sharp-pointed straight	No. 1
Scissors, cuticle, fine blades	prs. 1
Scissors, nail	prs. 1
Strop, in case	No. 1
Case, mahogany, unpolished, to contain above	No. 1

The contents of a case of chiropody instruments (1940 Pattern) (*see* Regulations for the Medical Services of the Army, 1938, Appendix 40A).

APPENDIX V

LIST OF MATERIALS, DRESSINGS, LOTIONS, ETC., REQUIRED BY A REGIMENTAL FOOT ORDERLY.

Lint, cotton, absorbent.
Wool, cotton, absorbent.
Wool, animal.
Plaster, adhesive ZnO.
Bandage, elastic adhesive (Elastoplast).
Bandages.
Boracic Acid Powder.*
Boracic ointment.*
Zinc ointment.
Tinct. benzoini co. (Friar's balsam).
Ung. iodi denegrescens.
Liqr. ferri perchlor.
Hydrogen peroxide.
Tincture of iodine.
Liquor cresoli sap. (Lysol) or other suitable disinfectant.
A book in which to enter names, regiments, etc., and disabilities of cases treated.

* These items are in short supply and may not be obtainable.

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